



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

August 1, 2001

Thomas F. Mueller
Chief, Regulatory Branch
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

Re: Biological Opinion for Docks on the Columbia River between Wells and Rock Island Dams: Franklin and Norma Rains (ACOE #1999-1-00570; NMFS No WSB-99-161), George Spear (ACOE #1999-1-00238; NMFS No. WSB-99-167), Porifirio Covarrubius (ACOE # 1999-1-00596; NMFS No. WSB-99-243), Rancho Manzanitas (ACOE#: 1999-1-01270; NMFS No. WSB-00-536), John Heffner (ACOE#: 2000-1-00193; NMFS No. WSB-01-153) and Ed Spence (ACOE #1999-1-01446; NMFS No. WSB-01-316)

Dear Mr. Mueller:

In accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*) and the Magnuson Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, the attached document transmits the National Marine Fisheries Service's (NMFS) Biological Opinion (BO) and MSA consultation on proposed dock construction along the Columbia River. The Army Corps of Engineers (ACOE) determined that the proposed actions are likely to adversely affect the Upper Columbia River steelhead (*Oncorhynchus mykiss*) and Upper Columbia River spring-run chinook (*O. tshawytscha*) Evolutionarily Significant Units (ESUs). Formal consultation was initiated on May 8, 2001.

This BO reflects the results of formal ESA consultation and contains an analysis of effects covering the Upper Columbia River steelhead and Upper Columbia River spring-run chinook in the Columbia River, Washington. The BO is based on information provided in the Biological Assessments (BAs) sent to NMFS by the ACOE over the past two years, and additional information transmitted via telephone conversations and e-mail. A complete administrative record of this consultation is on file at the Washington State Habitat Branch Office.

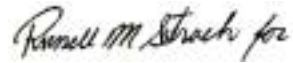
The NMFS concludes that implementation of the proposed projects is not likely to jeopardize the continued existence of Upper Columbia River steelhead or Upper Columbia River spring-run chinook or result in destruction or adverse modification of their Critical Habitat. In your review,

please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take.

The MSA consultation concluded that the proposed docks may adversely impact designated Essential Fish Habitat (EFH) for chinook and coho salmon. The Reasonable and Prudent Measures of the ESA consultation, and Terms and Conditions identified therein, would address the negative effects resulting from the proposed ACOE actions. Therefore, NMFS recommends that they be adopted as EFH conservation measures.

If you have any questions, please contact Joe Miller of the Washington State Habitat Branch Office at (360) 534-9309.

Sincerely,

A handwritten signature in dark ink, appearing to read "Donna Darm".

Donna Darm
Acting Regional Administrator

Enclosure

ENDANGERED SPECIES ACT-SECTION 7

**BIOLOGICAL OPINION
and
ESSENTIAL FISH HABITAT CONSULTATION**

**For Six Pending Army Corps of Engineers Permits Covering Residential Docks on the
Columbia River from Rock Island to Wells Dam**

WSB-99-161

WSB-99-167

WSB-99-243

WSB-00-536

WSB-01-153

WSB-01-316

Agency: Department of the Army, Corps of Engineers

Consultation
Conducted By: National Marine Fisheries Service
Northwest Region
Washington State Habitat Branch

Approved _____ Date _____
Donna Darm
Acting Regional Administrator

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I. BACKGROUND AND DESCRIPTION OF THE PROPOSED ACTIONS

A. Background

This Biological Opinion (BO) is the product of an Endangered Species Act (ESA) Section 7 formal consultation between the National Marine Fisheries Service (NMFS) and the Army Corps of Engineers (ACOE). This consultation covers the issuance of six permits for the construction and installation of residential docks. The Action Area for the proposed dock installations includes the Columbia River from Wells Dam south to Rock Island Dam.

The six pending dock construction permit applicants are: Franklin and Norma Rains (ACOE#1999-1-00570; NMFS# WSB-99-161), George Spear (ACOE#: 1999-1-00238; NMFS#: WSB-99-167), Porifirio Covarrubius (ACOE#: 1999-1-00596; NMFS#: WSB-99-243), Rancho Manzanitas (ACOE#: 1999-1-01270; NMFS#: WSB-00-536), John Heffner (ACOE#: 2000-1-00193; NMFS#: WSB-01-153), and Ed Spence and Doug Howell (ACOE#:1999-1-01446; NMFS#: WSB-01-316). The NMFS received requests for consultation for the individual projects on May 26, 1999; June 10, 1999; August 6, 1999; November 28, 2000; April 19, 2001; and July 17, 2001, respectively. Formal consultation was initiated on May 8, 2001.

The proposed docks would be constructed within the Evolutionarily Significant Units (ESUs) of upper Columbia River spring-run (UCRS) chinook (Endangered) and upper Columbia River (UCR) steelhead (Endangered), as well as their designated Critical Habitat.

The objective of this consultation is to determine whether the issuance of ACOE permits, and subsequent construction of the proposed docks, are likely to jeopardize the continued existence of the UCRS chinook or UCR steelhead or result in the destruction or adverse modification of their designated Critical Habitat. Additionally, this consultation will provide interim guidance for design characteristics, location attributes, and timing restrictions for future ACOE dock permit applicants within the Action Area.

The formal consultation process involved reviewing information contained in Biological Assessments (BAs), correspondence and communication between NMFS and the ACOE (numerous phone calls and emails), and visiting the project sites.

B. Description of the Proposed Action

The ACOE proposes to issue permits for the construction of temporary and permanent docks. Each dock would be used by homeowners for recreational, non-commercial purposes.

Each dock plan has some combination of the following elements: (1) a pier: the structure that is supported above the water by pilings and connects the dock to shore; (2) a ramp: the structure that connects the pier to the floating portion of the dock; (3) a float: the floating part of the dock to which boats tie up; and (4) pilings: often wood, metal, or concrete cylinders which are driven into the lake or riverbed and serve to stabilize other dock components.

The proposed dock projects vary in design, materials and construction techniques, but all would have the followings characteristics: (1) float materials would allow 60% light penetration (only 40% of the float surface area creates shade, or translucent materials that stop only 40% of light from passing through); (2) floats would not exceed dimensions of eight feet by 20 feet; (3) float materials contacting the water would be white in color or translucent; (4) pilings would not exceed four inches in diameter, or five inches if encased in PVC; (5) pilings would be spaced at least 18 feet apart from one another on the same side of any dock component; (6) piers would extend a minimum of 20 feet, perpendicular, from the shoreline; (7) piers and ramps would be grated or translucent and less than four feet wide; and (8) non-floating portions of the dock (piers and ramps) would be elevated at least two feet above the water.

Where proposed docks have been submitted as joint use/ownership, two floats, each eight by 20 feet, may be installed. However, all other characteristics of joint use/ownership docks would be the same as described above.

The proposed locations for all docks would have the following attributes: (1) no other docks are located within a 400 foot radius, (2) the water depth at the float is at least 20 feet (except for when temporary floats are used, see below), and (3) the native riparian vegetation is intact or will be restored. Removal of riparian vegetation would not occur during dock construction except in the exact footprint of pilings.

In the cases where it is impossible for an applicant to position the permanent float over a 20-foot depth (due to shoreline slope or other physical limitation), a temporary float may be used instead (i.e., temporary floats are allowed in waters less than 20 feet deep). Temporary floats would be removed from the Columbia River from March 1 through June 30, on an annual basis. The pier structure may be permanent when a temporary float is used. Additionally, docks with temporary floats must have the same specifications, light penetrating characteristics and location attributes listed above for permanent docks. The construction and installation of permanent dock structures would be limited to a work window that minimizes contact with and impacts to listed UCR steelhead and UCRS chinook (July 1 to February 28).

II. STATUS OF THE SPECIES AND CRITICAL HABITAT

The listing status, biological information, and Critical Habitat elements or potential Critical Habitat for the indicated species are described in Table 1.

Species	Listing Status Reference	Critical Habitat Reference	Biological Information
Upper Columbia River steelhead (<i>Oncorhynchus mykiss</i>)	Endangered Species, August 18, 1997 (62 Fed. Reg. 43937)	Designated Critical Habitat, February 16, 2000 (65 Fed. Reg. 7764)	Status Review of West Coast Steelhead from Washington, Idaho, Oregon and California, (Busby <i>et al.</i> , 1996)
Upper Columbia River spring-run chinook (<i>O. tshawytscha</i>)	Endangered Species, March 24, 1999 (64 Fed. Reg. 14308)	Designated Critical Habitat, February 16, 2000 (65 Fed. Reg. 7764)	Status Review of Chinook Salmon from Washington, Idaho, Oregon and California, (Myers <i>et al.</i> , 1998)

Table 1. References to Federal Register Notices and Status Reviews containing additional information concerning listing status, biological information, and Critical Habitat designations for listed species considered in this BO.

The proposed actions would occur within the designated Critical Habitat of both UCR steelhead and UCRS chinook. Essential features of this Critical Habitat include substrate, water quality/quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (65 Fed. Reg. 7764, February 16, 2000).

Upper Columbia River steelhead and UCRS chinook have both been negatively affected by a similar combination of habitat alterations and management practices. The primary habitat alteration has been hydrosystem development along the Columbia River. Chief Joseph and Grand Coulee Dams have blocked access to important spawning and rearing habitat, and the lower Columbia River mainstem dams act as partial barriers to passage for adults and juveniles. Other habitat degradation has occurred through irrigation diversions, urbanization and livestock grazing. Hatchery management practices have also encouraged the genetic homogenization of stocks and loss of important locally adapted traits throughout both UCR steelhead and UCRS chinook ESUs. A complete discussion of the important factors in the decline of UCRS chinook and UCR steelhead can be found in Busby *et al.* (1996); Myers *et al.* (1996); NMFS (1996); and 63 Fed. Reg. 11482 (March 9, 1998).

The natural production levels of both UCR steelhead and UCRS chinook are very low. For UCR steelhead, production has remained relatively constant in the major rivers of the ESU (Wenatchee, Methow, and Okanogan). Five year natural escapement levels (1989-93) averaged 800 steelhead in the Wenatchee River and 450 steelhead in the Methow and Okanogan rivers

combined. Natural production consistently falls below the 1:1 replacement level; up to 80% of total production is from hatcheries. Based on analyses of population size and production levels UCR steelhead are not capable of maintaining self-sustaining populations at this time (62 Fed. Reg. 43937, August 18, 1997).

Similar to UCR steelhead, UCRS chinook have exhibited a decreasing trend in abundance and productivity. The average recent escapement to the ESU has been less than 5,000 hatchery and wild chinook combined; all individual populations consist of less than 100 fish. Additionally, the genetic integrity of most remnant natural populations has been altered by hybridization with hatchery stocks. To date, there are at least six known spring chinook extinctions in this ESU (64 Fed. Reg. 14308, March 24, 1999).

III. EVALUATING PROPOSED ACTIONS

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by 50 C.F.R. Part 402 (the consulting regulations). The NMFS must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to adversely modify Critical Habitat. This analysis involves the initial steps of (1) defining the biological requirements and current status of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, the NMFS evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making the determination, NMFS must consider the estimated level of mortality attributable to (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmon's life history stages that may occur beyond the Action Area. If NMFS finds that the action is likely to jeopardize, NMFS must identify reasonable and prudent alternatives for the action.

Furthermore, NMFS evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' designated Critical Habitat. The NMFS must determine whether habitat modifications appreciably diminish the value of Critical Habitat for both the survival and recovery of the listed species. The NMFS identifies those effects of the action that impair the function of any essential element of Critical Habitat. The NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the action will adversely modify Critical Habitat, it must identify any reasonable and prudent alternatives available.

Guidance for making determinations of jeopardy and adverse modification of Critical Habitat are contained in NMFS' document: *The Habitat Approach, Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids*, August 1999.

For the proposed action, NMFS' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. The NMFS' Critical Habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration and spawning of the listed salmon under the existing environmental baseline.

A. Biological Requirements

The first step in the methods NMFS uses for applying the ESA Section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. The NMFS also considers the current status of the listed species; taking into account population size, trends, distribution and genetic diversity. To assess the current status of the listed species, NMFS starts with the determinations made in its original decision to list the species (i.e., UCR steelhead and UCRS chinook) for protection under the ESA. Additionally, the assessment will consider any new information or data that are relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to naturally reproducing population levels at which time, protection under the ESA would be unnecessary. Species or ESUs not requiring ESA protection have the following attributes: population sizes large enough to maintain genetic diversity and heterogeneity, the ability to adapt to and survive environmental variation, and are self-sustaining in the natural environment

Both UCR steelhead and UCRS chinook have similar basic biological requirements. These requirements include food, flowing water (quantity), high quality water (cool, free of pollutants, high dissolved oxygen concentrations, low sediment content), clean spawning substrate, and unimpeded migratory access to and from spawning and rearing areas (adapted from Spence *et al.* 1996). The biological requirements of these two ESUs likely to be adversely affected by dock permit actions are food and migratory access.

The NMFS has related the biological requirements for listed salmonids to a number of habitat attributes, or pathways, in the Matrix of Pathways and Indicators (MPI). These pathways (water quality, habitat access, habitat elements, channel condition and dynamics, flow/hydrology, watershed conditions, disturbance history, and riparian reserves) indirectly measure the baseline biological health of listed salmon populations through the health of their habitat. Specifically, each pathway is made up of a series of individual indicators (e.g., indicators for water quality include temperature, sediment, and chemical contamination.) that are measured or described directly (see: NMFS 1996). Based on the measurement or description, each indicator is classified within a category of the properly functioning condition (PFC) framework: (1) properly functioning, (2) at risk, or (3) not properly functioning. Properly functioning condition is defined as "the sustained presence of natural habitat forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation."

B. Factors Affecting the Species within the Action Area

Section 4(a)(1) of the ESA and NMFS listing regulations (50 C.F.R § 424) set forth procedures for listing species. The Secretary of Commerce must determine, through the regulatory process, if a species is endangered or threatened based upon any one or a combination of the following factors; (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence.

The proposed action includes activities that would have some level of effects with short-term impacts from the first category and the potential for long-term impacts from the third and fifth category. The characterization of these effects and a conclusion relating the effects to the continued existence of UCR steelhead and UCRS chinook is provided below, in Section IV.

Within the Action Area, Rock Island Dam to Wells Dam, substantial habitat modifications affect listed UCR steelhead and UCRS chinook. The most conspicuous habitat modification is caused by dams on the Columbia River. Essentially, the dams have transformed portions of the river from a lotic (free flowing) to lentic (standing water) environment. The establishment of slow flowing or stationary waters has altered the physical characteristics of the river. Compared to the historic lotic setting, portions of the Columbia River now have different hydraulics (very slow moving), thermal characteristics (temperature stratification, heat storage, etc.), substrate conditions (diminished sediment transport and increased sedimentation), as well as large artificial barriers to passage (Spence *et al.* 1996).

Concurrent with physical changes, indirect biological transformation has also occurred. Exotic species that prey on salmonids, including percids and centrarchids, have become established in the Columbia River (Wydoski and Whitney 1979). These predators may feed directly on salmonids (Tabor *et al.* 1993, Anglea 1997) or compete for other food or habitat resources. Other native predators including the pikeminnow have exploited the impounded environment created by dams, although their predation rates are higher in the lower Columbia River (Faler *et al.* 1988).

A number of general anthropogenic factors have also influenced listed species. Along the shores of the Columbia River, transportation infrastructure, agriculture, commercial and residential development has displaced riparian and shallow water habitat used by juvenile salmonids. This development also contributes some quantity of runoff and pollution, which may include sediments, fertilizer, pesticides, and petroleum products. Additionally, the management of non-native fishes as a fishery resource perpetuates their existence in the reservoirs and may contribute to predation on salmonids.

C. Environmental Baseline

The environmental baseline represents the current basal set of conditions to which the effects of the proposed action would be added. The term “environmental baseline” means “the past and present impacts of all Federal, state, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process ” (50 C.F.R. § 402.02).

The major factors influencing the environmental baseline within the Action Area include: (1) the presence of hydroelectric dams; (2) shoreline development (3) the NMFS Federal Columbia River Power System (FCRPS) BO.

1. Hydroelectric Dams

The three mainstem dams; Wells, Rocky Reach, and Rock Island, are the most prominent features that influence the environmental baseline within the Action Area. Additional mainstem dams above and below the Action Area also influence the environmental baseline within the Action Area. In total, the mainstem dams have substantially changed the Columbia River’s physical and biological characteristics. Specifically, dams have altered temperature profiles, inundated spawning habitat, created passage barriers, diminished sediment transport, prevented natural flow variation, eliminated lotic channel characteristics, and created habitat for species that prey on or compete with salmonids.

In terms of MPI indicators, the dams have caused a broad range of habitat degradation. At the Water Quality pathway, the hydropower dams have contributed to high instream temperatures and high concentrations (supersaturation) of dissolved oxygen and nitrogen (Spence *et al.* 1996). Portions of the Action Area have been identified on the State 303(d) list (Clean Water Act) for degraded temperature and total dissolved gas parameters (WSDOE 1998). As a result, the MPI Temperature indicator is *not properly functioning*.

At the Habitat Elements pathway, all indicators are *not properly functioning*. When the Columbia River was transformed from a flowing body of water to a series of slow moving reservoirs (NMFS 2000), much of the historic habitat was inundated and habitat functions lost. Sediment transport has been restricted to the extent that fine materials (silt, sand) settle out of the water column in the reservoirs instead of being flushed downstream (causing sedimentation) (NMFS 1996). Additionally, low water velocity and the physical presence of the dams (both upstream and in the Action Area) traps spawning substrates, preventing downstream recruitment (NMFS 1996). Off-channel habitat, refugia (remnant habitat that buffers populations against extinction), and large woody debris production has been reduced by inundating off-channel areas and historic riparian zones. Because the flow is highly regulated between dams, hydraulic variation is lacking. Consequently, pools, riffles and other instream habitat are greatly reduced or have been eliminated.

At the Habitat Access pathway, all three dams within the Action Area inhibit safe passage of listed salmonids. The dams create conditions where listed salmonids may be killed or injured by mechanical impingement or high dissolved gas levels (NMFS 1996, Spence *et al.* 1996). Additionally, the dams create false attraction to impassable areas, habitat for predators, and otherwise delay the progress of migrants. The direct presence of the dams, as well as secondary problems they cause puts the MPI Physical Barriers Indicator at *not properly functioning* within the Action Area.

Within the Channel Condition and Dynamics pathway, the Floodplain Connectivity indicator is *not properly functioning*. Dam operations, flow (reservoir) management, and the related inundation of off-channel rearing and floodplain areas have reduced the size and quality of floodplains along the Columbia River (NMFS 2000).

In terms of the Flow/Hydrology pathway, dams have affected the Change in Peak/Base Flows indicator to the extent that the indicator is *not properly functioning*. Dam operations, by nature, restrict and control the passage of water through river basins. The hydrosystem on the Columbia River, including the Action Area, affects the natural hydrograph by decreasing spring and summer flows and increasing fall and winter flows (NMFS 2000).

2. Shoreline Development

The Action Area is affected by varying levels of shoreline development in the form of marinas, docks, residential dwellings, roads, railroads, rip-rap, bulkheads, and landscaping. In terms of the MPI, shoreline development has primarily affected the Habitat Elements and Channel Condition and Dynamics pathways. Shoreline development has reduced the quality of nearshore salmonid habitat by (1) eliminating native riparian vegetation, (contributing to the *not properly functioning* status for Large Woody Debris and Refugia indicators); (2) displacing shallow water habitat with fill materials (contributing to the *not properly functioning* status for the Off-Channel Habitat indicator); and (3) by further disconnecting the Columbia River from historic floodplain areas (contributing to the *not properly functioning* status for the Floodplain Connectivity indicator).

3. Federal Columbia River Power System BO

On December 21, 2000, NMFS issued the FCRPS BO (NMFS 2000), finding that the FCRPS jeopardizes the continued existence and survival of UCR spring-run chinook and UCRS steelhead ESUs, among others. To avoid jeopardy, Federal agencies regulating the FCRPS were provided a number of Reasonable and Prudent Alternatives (RPAs). In the RPAs, NMFS identified four categories of actions where survival and recovery of listed salmonids may be enhanced: hydroelectric, habitat, harvest, and hatcheries. It is important to note that a number of the RPAs involve off-site mitigation (e.g., habitat improvements in estuaries and mainstem tributaries): modifying hydroelectric actions alone is insufficient to avoid jeopardy, habitat improvement is also necessary.

The FCRPS BO illustrates that the environmental baseline is degraded within the Action Area and throughout the impounded Columbia and Snake Rivers. Maintaining current hydroelectric practices without additional improvements in habitat, harvest and hatchery areas would jeopardize the continued existence of UCR chinook and UCRS steelhead ESUs.

IV. ANALYSIS OF EFFECTS

A. Effects of the Proposed Action

The NMFS' ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species or Critical Habitat together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline." Direct effects are immediate effects of the project on the species or its habitat, and indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur (50 C.F.R. § 402.02).

1. Direct Effects

Direct effects result from the agency action and include the effects of interrelated and interdependent actions. Future Federal actions that are not direct effects of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated. The direct effects of the proposed dock construction activities are limited to a temporary increase in turbidity and sound generated by pile driving.

Turbidity. Pile driving and dock positioning will cause sediments to be mobilized and, consequently, temporarily increase local turbidity levels. In the immediate vicinity of the construction activities (several meters), the level of turbidity would likely exceed the natural background levels by a significant margin and potentially affect fish.

Quantifying turbidity levels, and their effect on fish species, is complicated by several factors. First, turbidity from an instream activity will typically decrease as distance from the activity increases. How quickly turbidity levels attenuate is dependent upon the quantity of materials in suspension (e.g., mass or volume), the particle size of suspended sediments, the amount and velocity of ambient water (dilution factor), and the physical/chemical properties of the sediments. Second, the impact of turbidity on fishes is not only related to the turbidity levels, but also the particle size of the suspended sediments.

For salmonids, turbidity has been linked to a number of behavioral and physiological responses (i.e., gill flaring, coughing, avoidance, increase in blood sugar levels) which indicate some level of stress (Bisson and Bilby 1982; Sigler *et al.* 1984; Berg and Northcote 1985; Servizi and Martens 1992). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Bisson and Bilby 1982; Servizi and Martens 1987; Gregory and Northcote 1993). Although turbidity may cause stress, Gregory and Northcote

(1993) have shown that moderate levels of turbidity (35-150 NTU) accelerate foraging rates among juvenile chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect).

It is expected that turbidity arising from individual dock installations will be short lived and have a low potential for causing take. Turbidity impacts are expected to be of low intensity because (1) the spatial scale of each dock installation would be small, (2) restrictions on piling spacing would limit the overall number of pilings installed, and (3) the installation process would have timing restrictions to minimize contact with and effects on listed species.

Pile Driving Sound. Pile driving would cause temporary, intense underwater sound events. The extent to which the sound would disturb fishes would be related to the distance between the sound source and affected fish, and also by the duration and intensity of the pile driving operation.

The sound events caused by pile driving would likely elicit an evasive response from salmonids near the sound source. This evasive response could in turn result in juvenile salmonids abandoning predator refugia or local foraging areas, temporarily increasing risks of predation or diminishing foraging opportunities.

In the marine environment, Feist et al. (1992) have demonstrated that pile driving has tangible effects on salmonids. Among their conclusions: salmonids may be affected by pile driving sound within a radius of 600 meters of the sound source, and pile driving operations may affect the general behavior and distribution of salmonids.

For the docks proposed in this BO, pile driving sound is expected to have a minor impact on listed fish. Specifically, the duration of piling installation and the probability of take will be minimized by (1) the small size of the pilings, (2) small number of pilings to be installed, and (3) the installation timing restrictions minimizing contact with listed fishes.

2. Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur (50 C.F.R. § 402.02). Indirect effects can occur outside of the area directly affected by the action. Indirect effects can include other Federal actions that have not undergone Section 7 consultation but will result from the action under consideration. These actions must be reasonably certain to occur, or they are a logical extension of the proposed action. The primary indirect effects of installing docks include: (1) degradation of nearshore and shoreline habitat, (2) the creation of predator refugia, (3) changes in littoral productivity, and (4) increased boating activity.

Degradation of Nearshore and Aquatic Habitat. Docks may displace or degrade some normal habitat functions within their footprints. Because docks typically adjoin both shoreline and aquatic environments, their effects may be distributed across multiple habitat zones.

Where docks attach to the shore, riparian vegetation is often removed or displaced. Subsequently, riparian functions important to salmonids, such as shading, high flow velocity refugia, allochthonous nutrient production (including large woody debris production), and bank stabilization are lost. Additionally, docks are often attached to, or associated with, bulkheads and other shoreline modifications (rip-rap, retaining walls, landscaping) which have a similar capacity to preclude riparian function.

Predation. Docks also generate indirect impacts through modifying aquatic habitat features. One of the most significant is by creating habitat for species that prey on salmonids. In particular, docks may provide predators with locations for ambushing prey (e.g., behind pilings and under shaded floats), locations for spawning, thermal and velocity refugia, or refuge from other predators. Although some of these benefits may also apply to salmonids, docks may asymmetrically favor predators (particularly relative to juvenile salmonids) because they displace the complex habitat elements that would otherwise provide salmonids with cover and refuge from predators. However, relating docks to increased predation or salmonid production is a complicated issue.

The direct impact of individual docks on salmonid predation rates is related to a number of factors: predator and prey population dynamics, the species of predators present, the composition of aquatic species assemblages, availability of alternative prey, physical characteristics of the habitat surrounding the dock (e.g., light, temperature, depth, presence or absence of predator refugia), and others. These factors interact on many levels and make it difficult to compare dock-predation relationships among different areas or make broad statements about the direct effects of docks on salmonid predation. A clear relationship between docks and increased predation, resulting specifically from docks, by specific predators on salmonids within the Action Area, does not exist. Until a definitive study illustrates the role of docks in salmonid predation within the Action Area, NMFS must rely on the known habitat modifying effect of docks to determine whether docks increase the general vulnerability of salmonids to predation.

There are a number of reasons to suggest docks would contribute to greater predation rates on salmonids within the Action Area. First, known predators exist in the Action Area, particularly smallmouth bass (Tabor *et al.* 1993, Anglea 1997, Fayram and Sibley 2000). Second, smallmouth bass have an affinity for inwater structures, including dock components, during foraging and reproduction (Pflug and Pauley 1984, Malcom 1998). Third, docks and associated shoreline development reduce natural habitat complexity and decrease potential refugia from predators (Kahler 2000, Carrasquero 2001). Based on the presence of predators and the habitat created by docks, it appears likely that docks would contribute to salmonid predation.

Littoral Productivity. Docks may also have some general effects on littoral productivity. The shade docks create may inhibit the growth of aquatic macrophytes and other plant life (e.g., epibenthic algae and pelagic phytoplankton). These plants are the foundation for most aquatic food webs and their presence or absence affects many higher trophic levels (e.g., invertebrates and fishes). Consequently, the shade from docks may affect local plant/animal community structure or species diversity. At a minimum shade from docks may affect the overall productivity of littoral environments (White 1975, Kahler 2000).

Boating Activity. Residential docks are likely to have high levels of boating activity in their immediate vicinity, particularly adjacent to floats. Specifically, docks may serve as a mooring area for boats or a staging platform for recreational boating activities. There are several impacts boating activity may have on listed salmonids and aquatic habitat. Directly, engine noise, prop movement, and the physical presence of a boat hull may disrupt or displace nearby fishes (Mueller 1980, Warrington 1999a).

Boat traffic may also cause (1) increased turbidity in shallow waters, (2) uprooting of aquatic macrophytes in shallow waters, or (3) aquatic pollution (through exhaust, fuel spills, or release of petroleum lubricants) (Warrington 1999b). These boating impacts indirectly affect listed fish in a number of ways. Turbidity may injure or stress affected fishes (see: Direct Effects section). The loss of aquatic macrophytes may expose salmonids to predation, decrease littoral productivity, or alter local species assemblages and trophic interactions. Despite a general lack of data specifically for salmonids, pollution from boats may cause short-term injury, physiological stress, decreased reproductive success, cancer, or death for fishes in general. Further, pollution may also impact fishes by impacts to potential prey species or aquatic vegetation.

Summary. The dock designs addressed in this consultation have incorporated conservative design criteria that greatly reduce impacts to nearshore and aquatic habitats to the extent that baseline habitat functions will not be reduced. These criteria will prevent the degradation of existing baseline conditions primarily through (1) preventing the destruction of shoreline and riparian habitat, (2) creating conditions unfavorable for salmonid predation, (3) maintaining littoral productivity, and (4) keeping boats away from sensitive nearshore aquatic habitat.

Shoreline riparian, and nearshore aquatic habitat will be preserved through requiring applicants to leave existing riparian vegetation intact, eliminating the use of bulkheads or retaining walls as dock foundations, limiting the widths of ramps and piers, and by spacing docks at least 400 feet from one another.

Docks will be constructed to create conditions unfavorable for salmonid predation by limiting aquatic shading (restricting float sizes, constructing docks with translucent and reflective materials, using small diameter pilings, elevating ramps and piers); leaving inwater, complex habitat features in place; removing temporary docks when listed species are likely to be present; maximizing the spacing between pilings, and requiring 400 feet of space between individual docks.

Maintaining littoral productivity will be achieved by positioning all floats at least 20 feet offshore, positioning permanent floats over waters at least 20 feet deep, limiting aquatic shading, using temporary floats, and spacing docks at least 400 feet from one another.

Additional impacts from boating activities will be avoided by design and location criteria that promote boating activity away from shallow littoral habitat and migrating/rearing salmonids. It is assumed that most boating activity, associated with a dock, would be adjacent to the float. Floats would be located a minimum distance of 20 feet offshore, and permanent floats will be

located over water depths of 20 feet or more. Temporary floats would be removed when listed species are likely to be present. All docks would be spaced 400 feet from one another.

The impact minimizing criteria discussed in this BO are intended to prevent habitat degradation at the location of individual docks and to prevent the contiguous linear degradation of shoreline and aquatic habitats (mainly as a function of the 400 foot spacing criteria). Consequently, the docks covered in this BO are not expected to reduce nearshore or aquatic habitat functions in the Action Area or have a detectable deleterious effect on listed species.

B. Effects on Critical Habitat

The NMFS designates Critical Habitat for a listed species based upon physical and biological features that are essential to that species. Essential features of Critical Habitat for UCR steelhead and UCRS chinook include substrate, water quality/quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (65 Fed. Reg.7764, February 16, 2000).

The direct and indirect effects listed previously include some discussion of impacts to Critical Habitat. Overall, the installation and construction of the proposed docks will cause minor and transient effects on Critical Habitat. Directly, these effects will include temporary increases in turbidity as well as aquatic sound levels. In terms of the essential features of Critical Habitat, sound and turbidity may decrease water quality, availability of food, and safe passage conditions.

Docks have the greatest potential to affect Critical Habitat through indirect effects. As described above, docks may degrade shoreline and aquatic habitats beneficial to salmonids. The degradation of shoreline and aquatic habitats may secondarily create predator habitat or decrease littoral productivity. These effects include loss of cover/shelter, loss of riparian vegetation, reduced safe passage conditions, and potential reductions in food availability.

The dock characteristics, timing restrictions, and location attributes (minimizing criteria) incorporated in this consultation will prevent long term impacts to the essential features of Critical Habitat (see, Indirect Effects). Consequently, the issuance of permits for the installation of currently proposed docks will not adversely modify the Critical Habitat of either UCR steelhead or UCRS chinook.

C. Cumulative Effects

Cumulative Effects are defined in 50 C.F.R. § 402.02 as “those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the Action Area of the Federal action subject to consultation.” For this analysis, cumulative effects for the general Action Area are considered. Future Federal actions, including the ongoing operation of hatcheries, fisheries, and land management activities have been or will be reviewed through separate Section 7 consultation processes.

It is expected that ongoing land use changes will continue to occur within and adjacent to the Action Area of the current consultation. The most prominent of these changes will be the continued transition of agriculture lands, primarily orchards, to residential developments. Residential development is likely to degrade nearshore and aquatic habitats through the removal of native riparian vegetation, installation of bulkheads/retaining walls, and removal of complex inwater structures (woody debris, vegetation). Residential development may also increase demands for additional roads, waste treatment facilities and associated infrastructure.

V. CONCLUSION

The NMFS has determined that the effects of the proposed actions will not jeopardize the continued existence of UCR steelhead or UCRS chinook ESUs or result in the adverse modification or destruction of their Critical Habitat. The determination of no jeopardy is based upon the current status of the species, the environmental baseline for the Action Area, and the effects of the proposed actions.

The construction and installation of docks, as described and conditioned in this BO, would not degrade baseline habitat functions necessary for the survival and recovery of UCR steelhead and UCRS chinook. Directly, the installation process may cause transitory disturbances of sediment and increases in local sound levels, but these will be of low intensity and will not affect the long-term baseline habitat functions. Indirectly, the installation of the proposed docks, including implementation of conservative design, location and construction timing elements, would not further degrade baseline habitat conditions within the Action Area (see: Indirect Effects section).

VI. REINITIATION OF CONSULTATION

Consultation must be reinitiated if (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; or (3) a new species is listed or Critical Habitat is designated that may be affected by the action (50 C.F.R. § 402.16). The ACOE must monitor the implementation of listed reasonable and prudent measures and terms and conditions of the incidental take statement. The ACOE must reinitiate consultation if elements of the proposed project are implemented in a manner that is inconsistent with, or deviates from, the terms and conditions of this consultation. To reinitiate consultation, the ACOE must contact the Habitat Conservation Division (Washington Branch Office) of NMFS.

VII. INCIDENTAL TAKE STATEMENT

Sections 9 of the ESA prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific

permit or exemption. Section 4(d) enables the extension of this prohibition to animals listed as “Threatened” under the ESA. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as spawning, rearing, feeding, and migrating (50 C.F.R. § 222.106; 64 Fed. Reg. 60727; November 8, 1999). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or applicant carrying out an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to, and is not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and set forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

A. Amount or Extent of the Take

The NMFS anticipates that incidental take of UCR steelhead or UCRS chinook could result from project activities as described in the BO. Despite the use of the best scientific and commercial data available, NMFS cannot estimate a specific amount of incidental take of individual fish or incubating eggs. However, the mechanisms of expected effects are explained below.

The NMFS believes that there are several mechanisms by which take could occur. Direct harm or injury may result from installation and construction activities that generate sound and turbidity. Indirect harm, through long term habitat modification could occur if the impact minimizing criteria (dock characteristics, location attributes, or timing restrictions) are disregarded. The extent to which these mechanisms can result in effects on listed steelhead and chinook, or their habitat, can be described qualitatively, enabling reinitiation of consultation if such effects are exceeded during the project: (1) turbidity and pile driving sound will occur only during the approved work window (July 1 to February 28, 2001) to avoid take by direct harm or injury (i.e., in-water work must be completed on time to avoid reinitiating consultation), and (2) dock specifications, location attributes, and project timing restrictions have inherent limits that prevent take through increased predation, loss of habitat complexity, increased boating activities, and degraded littoral production (i.e., exceeding or disregarding these limits will reinitiate the consultation process).

B. Reasonable and Prudent Measures

The NMFS believes that the following reasonable and prudent measures (RPMs) are necessary and appropriate for minimizing take of UCR steelhead and UCRS chinook.

1. The ACOE will only issue permits for dock installations that minimize take by incorporating Best Management Practices (BMPs) to reduce potential impacts of staging and onshore construction activities.

2. The ACOE will only issue permits for dock installations that minimize take by incorporating BMPs to reduce potential impacts of inwater construction activities.
3. The ACOE will only issue permits for dock installations that minimize take by incorporating appropriate construction timing restrictions.
4. The ACOE will only issue permits for dock installations that minimize take by avoiding long term degradation of aquatic habitat or enhancing aquatic predator habitat.
5. The ACOE will only issue permits for dock installations that minimize take by avoiding long term degradation of nearshore/shoreline habitat.
6. The ACOE will conduct monitoring to ensure that habitat functions are not degraded as a result of permit issuances.

C. Terms and Conditions

To be exempt from the prohibitions of Section 9 of the ESA, the ACOE must comply with the following Terms and Conditions, which implement the Reasonable and Prudent Measures described above. These terms and conditions are non-discretionary.

1. Implement RPM #1 by conducting the following
 - a. All heavy equipment will be clean and free of external oil, fuel, or other potential pollutants (if heavy equipment is used).
 - b. A spill prevention, control, and containment (SPCC) plan will be implemented (if heavy equipment is used).
 - c. Native riparian vegetation will not be removed or destroyed during dock installation.
2. Implement RPM #2 by conducting the following
 - d. Heavy equipment will work from on-shore staging areas, with the exception of an excavator arm or bucket. Pile drivers may use constructed work platforms to access construction locations (i.e., a barge).
 - e. No inwater fill material will be allowed, with the exception of pilings or anchors.
3. Implement RPM #3 by conducting the following

- a. Installation and construction of permanent dock components will take place in a period where contact with salmonids is minimized (July 1 to February 28).
 - b. Temporary floats must be removed annually, from March 1 to June 30.
4. Implement RPM #4 by conducting the following
- a. Float materials will allow 60% light penetration (only 40% of the float surface area creates shade, or translucent materials only prevent 40% of light from passing through).
 - b. Floats will not exceed dimensions of eight feet by 20 feet. Two floats may be used for joint use docks. Joint use requires at least two separate property owners as applicants for the ACOE permit.
 - c. Float materials contacting the water will be white in color or translucent.
 - d. Floats must be located over water that is at least 20 feet deep. If this depth cannot be attained, a temporary float may be used.
 - e. No skirting will be placed on the floats.
 - f. The dock shall be built with materials that do not leach preservatives or other compounds that are known to be deleterious to fishes.
 - g. Pilings will not exceed four inches in diameter -or five inches if encased in PVC.
 - h. Pilings will be white in color.
 - i. Pilings will be spaced at least 18 feet apart from one another on the same side of any dock component.
 - j. Piers will extend a minimum of 20 feet, perpendicular, from the shoreline.
 - k. Piers and ramps will be grated or translucent, allowing light penetration greater than or equal to floats.
 - l. Piers and ramps will be less than four feet wide.
 - m. Non-floating portions of the dock (piers and ramps) will be elevated at least two feet above the water.

- n. No existing habitat features will be removed from the shore or aquatic environment (woody debris or substrate materials). If invasive weeds (e.g., milfoil) are present, removal may occur with authorization from the Washington State Department of Fish and Wildlife.
 - o. Docks must not be located within 400 feet of existing docks.
 - p. Docks must be cleaned or maintained to ensure light penetration.
5. Implement RPM #5 by conducting the following
- a. Shoreline armoring (e.g., bulkheads, rip rap, and retaining walls) will not occur in association with the dock installation (before, during, or after installation of the dock).
 - b. Riparian vegetation will be left intact during and following dock installation, except in the exact footprint of individual pilings.
 - c. If absent, riparian vegetation shall be established on shoreline areas adjacent to the dock.
6. Implement RPM #6 by conducting the following
- a. The ACOE must monitor docks for which they have issued permits. Dock monitoring must (1) determine adherence to permit conditions, (2) identify unanticipated indirect and cumulative effects, and (3) occur at least once a year.

VIII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or Action Area, to help implement recovery plans, or to develop additional information.

The NMFS would encourage the ACOE to coordinate with local governments, as well as NMFS, to develop broad guidelines for dock construction and installation within the Action Area. The development of a locally coordinated plan is likely to enhance the effectiveness and success rates of conservation based regulations, and consequently, confer benefits to ESA listed species

The NMFS must be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed species or their habitat. Accordingly, NMFS requests notification of the implementation of any conservation recommendations.

IX. MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT ACT

A. Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));
- NMFS shall provide conservation recommendations for any Federal or State activity that may adversely affect EFH (§305(b)(4)(A));
- Federal agencies shall within 30 days after receiving conservation recommendations from NMFS provide a detailed response in writing to NMFS regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NMFS, the Federal agency shall explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers a species’ full life cycle (50 CFR 600.110). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by Federal agencies regarding any activity that may adversely affect EFH, regardless of its location.

The objective of this EFH consultation is to determine whether the proposed action may adversely affect designated EFH, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse impacts to EFH resulting from the proposed action.

B. Identification of EFH

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of the impacts to these species' EFH from the proposed action is based, in part, on this information.

C. Proposed Actions

The proposed action and Action Area are detailed above in Section I of the ESA consultation. The Action Area includes habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

D. Effects of Proposed Action

As described in detail in Section IV of this BO, the proposed action may result in detrimental short- and long-term impacts to a variety of habitat parameters. These adverse effects include: temporary increases in sound and turbidity caused by dock construction and installation, and long-term modifications to aquatic, nearshore and shoreline habitats.

E. Conclusion

NMFS believes that the proposed action may adversely impact designated EFH for chinook and coho salmon.

F. EFH Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NMFS is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. The Reasonable and Prudent Measures and the Terms and Conditions outlined in Section VII are generally applicable to designated EFH for Pacific salmon and address adverse effects resulting from the proposed ACOE actions. Consequently, NMFS recommends that they be adopted as EFH conservation measures. If implemented by the ACOE, these measures will minimize the potential adverse impacts of the proposed project and conserve EFH.

G. Statutory Response Requirement

Please note that the Magnuson-Stevens Act and 50 CFR 600.920(j) require the Federal agency to provide a written response to NMFS' EFH conservation recommendations within 30 days of its receipt of this letter. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity. In the case of a response that is

inconsistent with the EFH Conservation Recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

H. Supplemental Consultation

The ACOE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600.920(k)).

Table 1. Species of fishes with designated EFH in the Action Area

Groundfish Species	redstripe rockfish <i>S. proriger</i>	Dover sole <i>Microstomus pacificus</i>
spiny dogfish <i>Squalus acanthias</i>	rosethorn rockfish <i>S. helvomaculatus</i>	English sole <i>Parophrys vetulus</i>
big skate <i>Raja binoculata</i>	rosy rockfish <i>S. rosaceus</i>	flathead sole <i>Hippoglossoides elassodon</i>
California skate <i>Raja inornata</i>	rougheye rockfish <i>S. aleutianus</i>	petrale sole <i>Eopsetta jordani</i>
longnose skate <i>Raja rhina</i>	sharpchin rockfish <i>S. zacentrus</i>	rex sole <i>Glyptocephalus zachirus</i>
ratfish <i>Hydrolagus coliei</i>	splitnose rockfish <i>S. diploproa</i>	rock sole <i>Lepidopsetta bilineata</i>
Pacific cod <i>Gadus macrocephalus</i>	striptail rockfish <i>S. saxicola</i>	sand sole <i>Psettichthys melanostictus</i>
Pacific whiting (hake) <i>Merluccius productus</i>	tiger rockfish <i>S. nigrocinctus</i>	starry flounder <i>Platichthys stellatus</i>
black rockfish <i>Sebastes melanops</i>	vermilion rockfish <i>S. miniatus</i>	arrowtooth flounder <i>Atheresthes stomias</i>
bocaccio <i>S. paucispinis</i>	yelloweye rockfish <i>S. ruberrimus</i>	
brown rockfish <i>S. auriculatus</i>	yellowtail rockfish <i>S. flavidus</i>	Coastal Pelagic Species
canary rockfish <i>S. pinniger</i>	shortspine thornyhead <i>Sebastolobus alascanus</i>	anchovy <i>Engraulis mordax</i>
China rockfish <i>S. nebulosus</i>	cabezon <i>Scorpaenichthys marmoratus</i>	Pacific sardine <i>Sardinops sagax</i>
copper rockfish <i>S. caurinus</i>	lingcod <i>Ophiodon elongatus</i>	Pacific mackerel <i>Scomber japonicus</i>
darkblotch rockfish <i>S. crameri</i>	kelp greenling <i>Hexagrammos decagrammus</i>	market squid <i>Loligo opalescens</i>
greenstriped rockfish <i>S. elongatus</i>	sablefish <i>Anoplopoma fimbria</i>	Salmonid Species
Pacific ocean perch <i>S. alutus</i>	Pacific sanddab <i>Citharichthys sordidus</i>	chinook salmon <i>Oncorhynchus tshawytscha</i>
quillback rockfish <i>S. maliger</i>	butter sole <i>Isopsetta isolepis</i>	coho salmon <i>O. kisutch</i>
redbanded rockfish <i>S. babcocki</i>	curlfin sole <i>Pleuronichthys decurrens</i>	Puget Sound pink salmon <i>O. gorbuscha</i>

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